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## Economic Commission for Europe

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### Group of Experts on Renewable Energy

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**Tracking progress and exchange of experiences on how to increase the uptake of renewable energy**

# Perspectives for renewable energy in the ECE region

**Note by the secretariat**

*Summary*

The United Nations Economic Commission for Europe (ECE) Group of Experts on Renewable Energy (GERE) is mandated to focus on activities directed toward the achievement of the energy related Sustainable Development Goal - SDG7, including substantially increasing the share of renewable energy in the global energy mix.

The ECE region has great potential for renewable energy deployment. It comprises member States with well-established renewable energy markets including sound market environments and well-developed infrastructure for deploying renewable energy. These countries can serve as examples for the other countries in the region with unexploited renewable energy markets. However, many countries face challenges to uptake renewable energy. These challenges include inadequate legal and regulatory frameworks, price distortion due to energy subsidies, a lack of energy market liberalisation, absence of public acceptance and/or low awareness and capacities about the potentials and application of renewable energy resources.

This paper is an abstract of a report prepared by dena, the German Energy Agency, entitled "Status and perspectives for renewable energy development in the ECE region." In addition to the review and analysis, the report uses experience from renewable energy market development in three ECE countries and the results of two discussions held with regional energy experts during COP23 in November 2017. It concludes that, besides the existence of

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strategic targets and accompanying policies, the actual form of policy implementation is crucial to successfully fostering renewable energy use in the electricity and heating sectors.

# I. Overview

1. The region of the United Nations Economic Commission for Europe (ECE) comprises 56 countries in Europe, North America and Asia, and is considered a promising region for deploying renewable energy technologies.

2. The ECE region has a developed renewable energy market. It had an installed renewable electricity capacity of 869 gigawatts (GW) in 2016. This accounted for almost half of the worldwide installed renewable electricity capacity (1,971 GW, excluding pumped hydro and mixed hydropower). Hydropower is the most established renewable energy technology for electricity generation, making up 412 GW [388 GW from large hydropower (LHP)] of total renewable electricity capacity. Wind energy and solar photovoltaics (PV) are the second and third largest renewable energy electricity markets, with installed capacities of 254 GW and 140 GW, respectively. These two markets are also showing the most dramatic growth. Between 2013 and 2016, the compound annual growth rate (CAGR) for the wind energy market was 7.6%, and 10.3% for the PV market.

3. At the policy level, the report shows that most ECE member States have adopted renewable energy promotion schemes – 49 member States have schemes in the electricity sector and 41 member States have them in the heat sector. In the electricity sector, the most widely established renewable energy promotion schemes are feed-in tariffs (FiTs) or premiums, tax reductions and investment incentives. Each of these policy instruments is in place in more than 40 ECE member States. Promotion schemes within the heat sector are mostly used to encourage heat generation from solar thermal energy, followed by biogas/biomass and geothermal energy.

4. As the costs of renewable energy technologies have continuously declined over the last two decades, new growth and future markets have begun to emerge. Some countries in the ECE region are now major market players. However, due to the region's diversity, renewable energy technologies are at different stages of development in different countries. Some have very low levels of renewable energy deployment, despite the existing potential.

5. In recent years, ECE member States have increased strategic planning in the area of renewable energy deployment, seeking to establish holistic and integrated national energy systems. However, in many ECE countries, a number of challenges persist that are slowing market development. Barriers such as inadequate legal and regulatory frameworks, distorted pricing of energy commodities due to subsidies, a lack of market liberalisation, absence of public acceptance and poor knowledge about the application potential of renewable energy resources still hamper the uptake of relevant technologies. Locally appropriate and tailored policy measures are vital for renewable energy deployment. Although requirements for policy frameworks are unique due to differing domestic market conditions, some approaches are nevertheless likely to result in successful implementation everywhere.

6. This report aims to support the market uptake of renewable energy by demonstrating its potential and applicability through selected policy instruments for ECE member States. It examines the current situation and challenges to renewable energy deployment across the region. It then presents different policy options for promoting renewable energy, their current state of implementation and their applicability. The report draws from the experience of

renewable energy policymaking in several ECE countries, and looks specifically at Ukraine, Georgia and Azerbaijan as case studies.[1]

7. The report seeks to provide insights into country-specific practices and experiences. Following a series of conversations about policy barriers and solutions, recommendations were developed to highlight commonly agreed priorities for effectively implementing renewable energy policies in national energy markets.

8. The report therefore gives policymakers a toolkit of selected renewable energy promotion schemes based on experiences from countries with higher renewable energy uptake. The policy toolkit can be applied to individual countries or at a regional level to help further develop the renewable energy market.

9. The report aims to provide useful information for more effective renewable energy policies that are predictable, consistent and steady in the long term, aligned with existing energy market structures, adjusted to the attributes of the defined key dimensions and factors of renewable energy deployment, and coordinated with other policies.

10. In order to determine the initial situation of an energy market and provide the future trajectory of each renewable energy technology four key factors are taken into consideration: political, economic, technical and social (Annex II). Accordingly, as a result of two expert meetings organised in Germany during the 23rd session of the Conference of the Parties (COP23) to the United Nations Convention on Climate Change (UNFCCC) and Hard Talks organized by the ECE a set of recommendations was made which can be used as an example for further successful policy implementation overall the ECE region.

## II. Status Quo of renewable energy deployment and electricity pricing in the ECE region

11. During the last decade, the worldwide expansion of renewable energy has progressed rapidly. In 2016, the installed electricity capacity of renewable energy sources in the ECE region (without pumped storage and mixed plants) amounted to about 869 GW, of which 388 GW came from LHP.[2] The electricity capacity from renewable energy in the ECE region therefore accounted for almost half of the 1,971 GW of renewable electricity capacity installed worldwide. Thus, renewable energy sources for generating electricity (excluding LHP) have developed faster and more dynamically in recent years and have therefore contributed the bulk of newly installed capacities.

12. The report entitled "Global Tracking Framework: ECE Progress in Sustainable Energy" provides insights into the status of renewable energy deployment in the ECE region. It also measures progress made on achieving target 7.2 of SDG 7, which aims to, "By 2030, increase substantially the share of renewable energy in the global energy mix" by providing data on the share of renewable energy in total final energy consumption (TFC). The 2017 report reveals that the ECE region was the only UN region that consistently increased its share of renewable energy in the mix over the tracking period 2012-2014. In addition, growth has recently accelerated. The share of renewable energy in TFC increased from 6% in 1990 to 11% in 2014, with growth happening fastest in South East Europe. The share of modern

[1] The full report "Status and Perspectives for Renewable Energy Development in the ECE Region" is available at https://shop.dena.de/fileadmin/denashop/media/Downloads_Dateien/erneuerbare/9251_Status_and_perspectives_for_renewable_energy_development_in_the_UNECE_region.pdf

[2] Large hydropower plants include all installations with a capacity of 10 MW or larger, defined by the International Renewable Energy Agency – IRENA.

renewable energy in TFC reached 11%, the second highest globally, as traditional biomass consumption is negligible in the region.

13. Countries in the ECE region differ in terms of the degree to which renewable energy technologies are established and in operation. While some renewable energy sources are used in many countries, others have yet to become popular. Hydropower is the most established source of renewable energy for electricity generation, and is used in both large and small plants. About one third of all ECE countries have well-established hydropower markets. While hydropower is used for electricity generation across the ECE region, it is important to note that markets for wind energy, PV, solar thermal energy, geothermal energy, biogas and biomass exist almost exclusively in ECE countries that belong to the Organization of Economic Cooperation and Development (OECD).

14. A significant number of national energy markets generate electricity from wind and PV. Countries with established onshore wind energy markets include Cyprus, Italy, Lithuania, Portugal and Spain. Far fewer countries have strong offshore wind markets, with the biggest being Belgium, Denmark, Germany, the Netherlands, Sweden and the United Kingdom. While wind energy is more prevalent in Western European countries, PV markets are more widely spread: Bulgaria, Romania, Slovakia, Slovenia and the Czech Republic all have established PV markets. The markets for both wind and PV are growing across the ECE region.

15. Hydropower capacity has grown less or even stagnated in recent years. In some cases, it has declined. Many ECE countries are already using much of their economically exploitable hydropower potential, which results in less dynamic market growth and fewer new installations. In the majority of ECE countries, a significant portion of hydropower comes from LHP, which accounts for between 70% and 100% of installed hydropower capacity. A few countries obtain the majority of their hydropower from small and medium-sized plants, pumped storage and mixed plants. In Belgium, however, LHP contributes just 39% to total hydropower capacity. Most notably, the LHP sector has hardly grown between 2013 and 2016; its capacities have grown by an average of 0.9% annually. Small and medium-sized plants, pumped storage and mixed hydropower plants have increased by over 2 GW, thanks to an average annual growth rate of 1.7%. Overall, the hydropower sector has expanded by an annual average of 1.0%.

16. In numerous countries, the modern use of biomass (as opposed to traditional uses such as burning wood at home) and biogas to generate electricity is either already established or new markets have recently begun to emerge. However, bioenergy had the smallest electricity generation capacity of the four technologies in the ECE region: 54 GW in 2016. The sector grew by an annual average of 2.8%, from 47 GW in 2013 to 53 GW in 2016. [3]

17. The main sources for renewable heat are geothermal energy, solar thermal energy, bioenergy and concentrated solar power. Despite its potential, geothermal energy is only exploited in some ECE countries. However, many countries have good potential, and markets for geothermal heat are emerging in several others. Solar thermal energy, on the other hand, is a more established renewable heat source. Countries such as Israel, Switzerland, Turkey and the United States have significant solar thermal markets, and the technology is gaining importance in many others. The modern use of bioenergy to generate heat is less common in the ECE region. Concentrated solar power plants are only relevant in the United States and Spain, due to the need for sites with high solar radiation. Overall, the renewable heat sector in the ECE region is not as developed as the sector for renewable electricity – despite the high potential in many member States.

[3] IRENA defines bioenergy as "energy derived from organic, non-fossil material of biological origins (biofuels), which can used for the generation of heat or electricity."

18. The PV and wind energy markets can be described as "dynamic" renewable energy markets for electricity, since their relative growth is noticeably higher than other renewable energy sources. Analysis of PV deployment in the ECE region shows that the average market growth rate between 2013 and 2016 was high, at 37.1%. However, the share of total electricity generation capacity stayed low, at 3.89%.

19. The average annual growth rate of wind energy between 2013 and 2016 was lower than that of PV, amounting to 14.2%. However, the average ECE market share of total electricity generation capacity in 2014 was higher for wind than PV, reaching almost 8%.

20. Electricity prices are a crucial factor for the deployment of renewable energy. They have a major influence on the economic viability of renewable energy generation and on social acceptance for renewable energy expansion and are a competitive factor for local energy-intensive industries. Electricity prices are composed of electricity generation costs and various taxes and levies. Electricity generation costs from all types of generating plants determine the electricity market price and therefore play a decisive role in the economic viability of renewable energy generation. ECE member States with particularly low electricity prices or subsidised electricity from conventional energy sources present a difficult starting position for the uptake of renewable energy. This makes it even more important that renewable energy promotion schemes are in place. However, running these schemes entails promotion costs, usually redistributed in the form of taxes or levies that increase final consumer electricity prices. This might lead to lower social acceptance for renewable energy deployment. At the same time, high electricity prices mean that local energy-intensive industries might suffer competitive disadvantages and consider shifting their production sites abroad.

21. Hence, in the context of renewable energy deployment, electricity pricing constitutes an important trade-off between implemented renewable energy promotion schemes, social acceptance and the international competitiveness of local industries. Therefore, thorough consideration and monitoring of electricity pricing is necessary for the successful uptake of renewable energy. In terms of electricity prices, large differences exist between ECE member States regarding electricity prices for households and electricity prices for industrial consumers. The average ECE household electricity price is €0.125. The price of household electricity varies throughout the ECE region, with Denmark paying the highest rate at €0.308 and Kyrgyzstan the lowest at €0.010.

22. Industrial electricity prices in OECD and non-OECD countries in the ECE region diverge less than private-sector electricity prices in OECD and non-OECD countries. The similarity of electricity prices in the industrial sector – despite varying levels of GDP per capita in OECD and non-OECD countries – is due to the fact that national economies want to keep these prices low in order to increase their competitiveness as industrial locations.

23. Taxes do have a strong influence on electricity pricing. In some countries, household electricity prices are even lower than electricity generation costs. As discussed above, when low and often subsidised electricity prices are combined with a lack of promotion schemes, it can hinder market uptake and integration of renewable energy technologies. This is because the technologies will be unable to compete with conventional electricity generation technologies on the energy market. Schemes such as FiTs, premiums, quota systems, auctions, and the reduction of fossil fuel subsidies can help to make renewable energy more competitive by lifting the renewable electricity sales price above the electricity market price.

24. An analysis of renewable energy investments in 17 ECE countries, including the Caucasus, Central Asia, the Russian Federation, and South East and Eastern Europe, is provided in the ECE Renewable Energy Status Report 2017, which was produced by REN21 and ECE. The report reveals that despite having a total population of 300 million, the 17 countries received only a fraction – 0.2% – of global investment in renewable energy in 2015.

This was down from 0.5% in 2014. Investment in renewable energy in these countries totalled $400 million in 2015, a notable decline from $700 million in 2014.

25. The status quo analysis shows that renewable energy deployment in the ECE region varies considerably across the member States. Electricity capacities from renewable energy sources have grown substantially for more than a decade. While the "dynamic" renewable energy technologies – wind energy and PV – are expanding a great deal, hydropower and bioenergy markets have had lower growth rates. LHP makes a large contribution to the total installed renewable electricity capacity. Overall, the renewable electricity market is much more developed than the renewable heat sector in the ECE region.

26. In terms of investments, the eastern ECE region in particular lags behind global developments and has even seen a decline in renewable energy investments over the past two or three years. It is clear that barriers to investment continue to exist – however, examples of past investments as well as government plans to attract more investors suggest the potential for future growth. The analysis of ECE electricity prices shows that the price range is greater for households than for industrial consumers. This is because national economies want to increase their competitiveness as industrial locations and attract further investment. While electricity generation costs, including network expenses, are comparatively homogenous across ECE member States, national shares of electricity taxes and levies are more diverse across the region. The shares of taxes and levies, which are included in the total electricity price, range from close to zero to almost two-thirds. Very low electricity prices are an obstacle to market entry for renewable energy. In this context, direct or indirect subsidies for conventional energy sources should be minimised to support the deployment of renewable energy. Furthermore, introducing renewable energy promotion schemes can help make renewable energy more competitive.

27. Overall, the conclusion of the ECE Global Tracking Framework report indicates that the current rate of progress is not sufficient to achieve the 2030 goal of a renewable energy share in TFC of 36%. This applies both globally and to the ECE region. In addition, the report argues that assessing progress to achieve higher shares of renewable energy should go beyond focusing on one single indicator and include other indicators such as capacity installations, the share of renewable energy in total primary energy supply (TPES) and investments in renewable energy.

## III. Renewable energy policies in the ECE region

28. The market for renewable electricity generation is rapidly growing in the ECE region. This is strongly linked to the introduction of a wide range of renewable energy promotion schemes and measures in the ECE electricity sector. These major renewable energy promotion schemes and measures in the electricity sector can be broadly categorised into non-financial and financial schemes.

29. Non-financial schemes encourage the deployment of renewable energy by improving the necessary infrastructure so that market entry and integration become easier. Examples of non-financial instruments include officially communicated renewable electricity expansion goals, guaranteed grid access, priority feed-in, net metering and net billing. Guaranteed grid access entitles independent power producers (IPPs) and autoproducers, such as private households and industrial entities, to grid access. Guaranteed grid access for power plants might be limited by a certain minimum or maximum capacity. Priority feed-in schemes build on guaranteed grid access and require utilities to purchase renewable electricity.

30. Net metering and net billing are billing mechanisms, which credit renewable electricity producers for the net value between the electricity they feed into the grid and the electricity they use. Electricity surpluses are remunerated either as credit for future electricity

demand (net metering) or as direct financial compensation at an agreed rate or tariff (net billing).

31. Financial schemes promote renewable energy deployment by creating investment incentives for renewable energy technologies. Some are general financial support instruments, while others are designed to raise the sales price of renewable electricity above market prices in order to help renewable energy compete with conventional energy sources. General financial support instruments include investment subsidies, credit grants, lower interest rates, tax credits or exemptions, and government R&D spending. Schemes to raise electricity prices can be subdivided into price-based, quantity-based or hybrid promotion schemes. FiTs or premiums are price-based promotion schemes because they grant long-term, stable remuneration for generating renewable electricity and feeding it into the grid. The FiT is either remunerated with a fixed tariff or at the electricity market price, which is topped up by a variable market premium.

32. Quantity-based promotion schemes are mainly quota systems, such as renewable portfolio standards and renewable obligations. They require national utilities to maintain a certain share of renewable energy in total electricity generation. Quota systems are often combined with trading systems for green certificates or renewable energy certificates. These certificates are issued to electricity producers for each unit of renewable electricity generated and can be traded. Certificate prices are determined by the market, based on the total number of traded and supplied certificates and on the demand for certificates, which is highly influenced by the renewable energy quota.

33. Auctions can be considered as hybrid schemes, since they include elements of both price-based and quantity-based promotion schemes. In the context of renewable electricity projects, auctions are public bidding processes in which long-term contracts are awarded for the purchase of renewable electricity. These contracts are called power purchase agreements (PPAs) and are awarded either for an agreed amount of renewable electricity or for the electricity output of an auctioned amount of installed renewable electricity capacity. Auctions provide stable remuneration for renewable electricity generation, something which is also guaranteed by price-based promotion schemes. Auctions allow legislators to control the expansion of installed renewable electricity capacities, which is also the case with quantity-based promotion schemes. In auctions, the long-term contracts are awarded exclusively on the basis of price criteria, such as lowest electricity generation costs. Tendering procedures, by contrast, award long-term contracts on the basis of various factors, which is why they are referred to as multi-criteria auctions.

34. Out of 52 analysed countries, 45 have official – and to a certain extent technology-specific – renewable energy expansion goals.[4] Thirty-three ECE countries give utilities, IPPs and smaller-scale autoproducers in the industrial and private sector unlimited grid access, while 15 countries restrict guaranteed grid access by capacity limits. Priority feed-in exists in 25 ECE countries.

35. Although the implementation of renewable energy policies in the ECE region seems to be at an advanced level, simply introducing promotion schemes and measures does not necessarily improve the uptake and integration of renewable energy in the electricity and heat sectors. In order to be effective, renewable energy policies need to be predictable, consistent and steady in the long term. They also have to be aligned with the existing energy market structure, adjusted to the attributes of the defined key dimensions and factors of renewable energy deployment, and coordinated with other existing policies.

36. In view of the GERE objectives of promoting the uptake of renewable energy, improving access to affordable energy sources and increasing energy efficiency, this report

[4] Andorra, Liechtenstein, San Marino and Monaco have not been included due to a lack of data.

analysed the status of and perspectives for renewable energy development in the ECE region. The background of renewable energy deployment was described, key dimensions and factors were determined as well as global trends and fields of application were examined. The current status of renewable energy deployment and the corresponding growth of renewable energy markets in the ECE region were explored. In addition, all the major promotion schemes and their stage of implementation in the electricity and heat sectors for each member State were describe.

## IV. Making the energy transition work: Evidence from successful policy implementation

37. Even if policy measures to foster renewable energy are in place, they do not necessarily and automatically lead to renewable energy investments. Adverse effects and obstacles indirectly linked to the political and regulatory framework of energy markets may have a negative impact on project realisation. The key factors influencing the success of renewable energy policies at the implementation level can be grouped as follows:

(a) Political framework and market regulation;

(b) Infrastructure capacity and technical feasibility;

(c) Economic viability and financing;

(d) Acceptance and awareness raising.

38. Two expert meetings organised in Germany during COP23 in November 2017 focused on the successful implementation of renewable energy policies in the electricity sectors and heating markets of ECE member States. The ECE organizes national renewable energy Hard Talks that are specific multi-stakeholder policy dialogue events in cooperation with host countries, local counterparts and other partners such as the Renewable Energy Policy Network for the 21st Century (REN21), the German Energy Agency (dena) and Revelle Group.

The aim is to:

(a) Investigate barriers that hinder the full unfolding of renewable energy potential in the host country;

(b) Facilitate the exchange between political decision makers, project developers, investors and technology providers and thus between the public and private sector;

(c) Point out prioritised solutions to improve the investment climate for renewable energy and to foster discussion to what the ECE can provide with similar initiatives.

39. In 2016 and 2017, Hard Talks adapted to the specifications and requirements of each host country were held in Georgia, Ukraine, and Azerbaijan. At the heart of the Hard Talk format is the Discussion Paper, a "problem/solution" format document, which facilitates a practical dialogue. The common denominator of the Hard Talk experience is that, despite the many differences in the three host countries, common themes have arisen that prove that the main influencing factors to pave the way for renewable energy uptake are fundamentally identical even if different policy frameworks apply. Moreover, the discussions in all three Hard Talks have proven that the experience and good practices associated with addressing those common, largely identical influencing factors are easily transferable from one country to another. Therein lays the added value of the Hard Talks: mobilizing international experience to address domestic issues.

40. The discussions held and experience gained during the three Hard Talks and two expert meetings show that, besides political targets and accompanying policies, the actual

form of policy implementation is crucial to successfully fostering renewable energy use in the electricity and heating sectors. Strategies should also consider the different aspects that might result in the non-realisation of renewable energy projects. To implement policies effectively, policymakers must take account of the various drivers and obstacles discussed in the four key factors previously mentioned.

41. The market conditions for renewable heat appear to be more challenging than those for renewable electricity. This is because of the comparatively high subsidies for gas and oil, and a lack of incentives and subsidies for renewable heat. Building regulations, energy efficiency regulations and different standards for the fuel and the technologies add to the complexity of the renewable heat sector. Furthermore, gas networks directly compete with networks for district heating.

42. Thereby, policymakers should be aware of the specific challenges that renewable energy face in the heating sector. Expert meetings and talks of the kind held in Ukraine, Georgia and Azerbaijan create scope for identifying constraints and sharing examples of good practice in renewable energy development. Multi-stakeholder-based dialogue can help to develop a common view and accelerate the deployment of renewable energy.

43. Based on the obtained report results, a toolbox for policy makers has been developed, which is presented in Annex I. The toolbox provides an overview of the impact dimension and description of all major renewable energy promotion schemes and measures, their particular strengths and primary outputs as well as examples of ECE and non-ECE countries, which have shown good practice when implementing their respective promotion scheme or measure. Policy makers can consider elements from these toolboxes as a basis for decision-making processes within the framework of promotion scheme implementations. However, this toolbox does not provide a template for decision-making or on how to develop or implement policies. Further information is ultimately needed to inform decision-makers in their renewable energy policymaking.

## V. Recommendations for the Group of Experts

44. In recent years, most countries have focused on policy measures aimed at increasing renewable energy capacity in the electricity sector. These policies are important, but further attention must be directed toward the heating sector, as all ECE member States are located in the northern hemisphere. In addition, policies aimed at the cooling sector are needed as consumption is projected to increase. Further, to highlight the need for improvements in the heating/cooling sector the GERE could support activities and highlight policy options and measures including the development of infrastructure and technologies such as district heating networks, waste heat utilisation, and combined heat and power plant (CHP).

45. The heterogeneity of the ECE region facilitates the establishment of country-to-country partnerships within the GERE to discuss different problem-solving approaches. The experience of member States that lead in renewable energy integration can serve as examples for countries looking for advice on potential solutions. As a first step, the GERE could cluster ECE member States according to their main barriers and potential future challenges allowing for a targeted approach to increase the uptake of renewable energy. Based on the created clusters, the GERE could establish specific working groups, which focus their activities on finding solutions for the respective barrier or challenge. Within the work of the barrier-specific working groups partnerships could be set up between ECE member States facing a particular challenge within their deployment of renewable energies and ECE member States with more experienced renewable energy markets which have already overcome this specific barrier. Based on this approach of interchanging experience, possible solutions and good

practices can be identified more purposefully. Results should be shared via a web-based platform.

46. This report serves as a policy toolkit, summarizing options shaping positive frameworks for renewable energy development. However, for the successful implementation of policies directed toward the uptake of renewable energy, factors other than political should be considered including economic viability, existing infrastructure, consumer education and social acceptance. Member States could be supported by the example of selected countries to develop individual policy implementation pathways.

47. The GERE could interact more frequently with political decision makers, business representatives, academic research organisations and civil society thus enabling a more dialogue-oriented exchange. For example, an online platform could be established where interested stakeholders have the opportunity to pose specific questions or to contact experts directly.

48. Overall, a series of concrete actions directly at ECE countries, on a demand-driven basis and tailored to identify and respond to the specific country needs, could be developed under an umbrella programme. This umbrella programme would include a more integrated ECE work on renewable energy uptake for sustainable development structured, among others, within these main three clusters: (i) policy advice and dialogue, (ii) capacity building and (iii) project development support.

## VI. Conclusion

49. When looking at how renewable energy deployment has developed internationally, a number of distinct global trends can be identified. Renewable energy promotion schemes dominated the early stages of global deployment, especially in developed and emerging ECE markets. Over time, investment costs for renewable energy technologies have dropped, while transnational technology transfer and the international dissemination of renewable energy policy goals have increased. In turn, this has increased the uptake of renewable energy, particularly in developing ECE countries. In established renewable energy markets, policies that initially aimed to expand renewable energy have evolved to become policies that pursue cost-efficient and managed renewable energy deployment. The complexity of promotion schemes has also increased, as has the need to adapt energy system infrastructures to the highly fluctuating and decentralised feed-in of renewable energy. Furthermore, the regulatory integration of renewable energy autoproducers and newly evolving business models has gained importance. On the macroeconomic level, it is now crucial to monitor how renewable energy deployment affects pricing mechanisms, such as those that determine electricity/energy prices and carbon prices within emission trading schemes.

50. Overall, the uptake of renewable energy has progressed well so far, although major differences in renewable energy expansion exist between ECE member States. With an installed renewable electricity capacity of 869 GW, the ECE region accounts for almost half of the 1,971 GW installed worldwide. Hydropower is the most established renewable energy technology for generating electricity, making up 412 GW (388 GW from LHP) of total renewable electricity capacity. Electricity capacities from renewable energy sources have grown substantially in the ECE region over the last few years. This is largely due to the rapid expansion of wind energy and PV, which have high growth rates in several ECE countries such as Ukraine and Kazakhstan (wind energy), and Russia and Turkey (PV). Although the wind and PV markets are growing the most dynamically of all renewable electricity markets in the ECE region (with a compound annual growth rate of 7.6% and 10.3%, respectively,

between 2011 and 2014) they are only the second and third largest markets overall (with installed capacities of 254 GW and 140 GW, respectively).

51. Electricity prices play a crucial role in efforts to shift energy markets towards more renewable energy. This is because the prices have a major influence on social acceptance for renewable energy deployment. Electricity prices are considered a decisive competitive factor for energy-intensive industries, they strongly affect the economic viability of renewable energy technologies, and they determine the effectiveness of renewable energy promotion schemes. If a country has particularly low electricity prices, it can hamper the uptake of renewable energy, since low prices reduce the economic viability of renewable energy technologies, especially when they face tough competition from conventional energy sources. Introducing effective schemes for promoting energy efficiency might also prove difficult because low prices reduce the incentive to save energy. Therefore, electricity pricing must be thoroughly considered and monitored to ensure a successful uptake of renewable energy.

52. Most ECE member States have already adopted renewable energy promotion schemes: 49 member States have schemes in the electricity sector, and 41 have schemes in the heat sector. In the electricity sector, the most widely established promotion schemes are FiTs or feed-in premiums, tax reductions, and investment incentives. These policy instruments are in place in more than 40 ECE member States. In the heat sector, most schemes aim to encourage heat generation from solar thermal energy, followed by biogas/biomass and geothermal energy. In the building sector, roughly two-thirds of the ECE countries have promotion schemes in place, and eight countries are currently developing renewable energy promotion schemes or measures. So far, the electricity sector has received more political attention as a field of application for renewable energy than the heat sector. It is important to note that renewable energy promotion schemes do not automatically translate into a substantial expansion of renewable energy in a given country. Many promotion schemes are in place across the region, but ultimately the uptake of renewable energy depends much more on market access and the effective implementation of the schemes than on their simple existence.

53. As the results of the expert meetings and Hard Talks in dena's report show, the approach to and details of policy architecture and implementation are vital for successfully boosting renewable energy deployment. In order to design effective policies and ensure swift implementation, opportunities and barriers associated with the four key types of factor identified – political framework, economic viability, infrastructure, and social acceptance and awareness – must be addressed and taken into account. Another issue to be kept in mind during implementation is that the market conditions for renewable heat in the ECE region appear to be more challenging than those for electricity. While formulating an effective and functioning policy framework seems to require specific and tailored approaches in different countries, implementation seems to depend on a set of good practices that are almost universally applicable and likely to be successful. Multi-stakeholder forums, such as the Hard Talks that contributed to this report, can be excellent opportunities for shaping a common view of market structures, frameworks, challenges and drivers, and for boosting renewable development in a given country.

# Annex I

**Policy Toolbox: Political and Regulatory promotion schemes and measures**

| *Promotion schemes and measures* | *Impact dimension* | *Description* | *Strengths primary output* | *Good practice* |
|---|---|---|---|---|
| Official targets for renewable energies | Political | Definition and official communication of (technology-specific) binding or non-binding expansion goals. | Planning security | EU member States, United States of America (state level) |
| Market / grid access | Political / Regulatory | Guaranteed grid access for independent power producers or autoproducers possibly restricted by capacity limits. | Market integration | Chile |
| Net Metering / Net Billing | Political / Regulatory | Billing mechanisms, in which renewable electricity generating entities are credited for the net value between their supplied electricity fed into the grid and their demanded electricity. Produced electricity surpluses can be remunerated as electricity credit counting towards future electricity demand (net metering) or as direct financial compensation at an agreed rate or tariff (net billing). | Market integration | Australia, United States of America (state level), Turkey |
| Priority feed-in and feed-in tariff or premium | Political / Regulatory | Priority feed-in prescribes the mandatory purchase of renewable energy electricity by utilities.<br>Feed-in tariffs or premiums grant long-term stable remuneration for the feed-in of renewable energy electricity, either via fixed tariffs (feed-in tariffs) or at electricity market prices topped up by a adjusting market premium (feed-in premium). | Financial support, market integration, investment and planning security, investor diversity | Germany, Italy |
| Green certificates, Renewable energy certificates | Political / Regulatory | Tradable certificates, which are often used in combination with quota systems. The certificates are issued for each unit of generated and supplied renewable energy electricity. | Market integration | Sweden, Norway |
| Quota system | Political / Regulatory | Obligatory renewable energy share of energy electricity supply or demand, mandated from utilities. | Financial support, market integration, expansion control, cost effectiveness, promotion of innovation | United States of America (state level), India (state level) |

| *Promotion schemes and measures* | *Impact dimension* | *Description* | *Strengths primary output* | *Good practice* |
|---|---|---|---|---|
| Auctions | Political / Regulatory | Public bidding process, which awards long-term electricity purchase contracts for an agreed amount of produced renewable electricity or for the electricity output from a certain auctioned quantity of renewable electricity capacity. Long-term contracts are awarded exclusively according to price-based criteria. | Financial support, investment security, market integration, expansion control, cost effectiveness, promotion of innovation | Brazil, Uruguay, India |
| Tender | Political / Regulatory | Multi-criteria auctions. | Financial support, investment security, market integration, expansion control, cost effectiveness, promotion of innovation | Kenya, Japan |
| Renewable Heating Obligations | Political / Regulatory | Obliged minimum share of energy demand for heating from renewable energy sources or CHP plants demanded from building owners. | Financial support, market integration, expansion control. | Denmark, Germany |
| Further investment incentives | Political / Regulatory | Investment subsidies, credit grants, reduced rates of interest, tax credits or exemptions, governmental R&D expenditures etc. | Financial support, promotion of innovation | USA (federal and state level), Germany, France |

**Key dimensions and important drivers for developing renewable energy markets**

| *1. Political regulatory* | | | | *2. Economic* | | *3. Social* | *4. Technical* | |
|---|---|---|---|---|---|---|---|---|
| Security of Supply | Regulatory Target | Promotion | Market Access | Energy Prices | Economy and Value | Social | Potential | Integration |
| Fossil Resources | Share of RES | Fixed Tariff/premium | Priority Purchase | Electricity | New Industries | Costs | Theoretical | Grid integration |
| Future Demand | Technology Target | Net metering /billing | Full access | Liquid Fuels | Labour Market | Benefits | Technical | Grid expansion |
| Import Quota | Emissions Reduction | Quota obligation | Limited Access | Gaseous Fuels | Competitiveness | Acceptance | Economic | Decentralized Production |
| Renewable Resources | Efficiency | Power Purchase Agreement | No access | Solid Fuels | | Knowledge | R&D | Storage |
| Access to Energy | | Tender | | | | Awareness | | Smart metering |
| | | Auction | | | | | | Demand |
| | | Taxes/other incentives | | | | | | |
| | | Investment security | | | | | | |

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**Hard Talks and opportunities to support renewable energy investments**

# Implementation of Renewable Energy National Action Plans in Selected ECE Countries

**Note by the secretariat**

*Summary*

Progress and efforts of selected United Nations Economic Commission for Europe (ECE) member States to achieve their stated National Renewable Energy Action Plans (NREAPs) and renewable energy commitments are here summarized. These renewable energy pledges assist in decarbonizing electricity production in line with the considered countries' Nationally Determined Commitments (NDCs) to reduce carbon emissions under the United Nations Framework Convention on Climate Change (UNFCCC). The following analysis also shows the progress of the considered countries toward achieving SDG 7.2 which aims to increase substantially the share of renewable energy in the global energy mix by 2030.

As example, the ECE member States considered are Albania, Bosnia and Herzegovina, Montenegro, Serbia, Georgia, Azerbaijan, Kazakhstan, Uzbekistan, Germany, Italy, Netherlands, and Sweden. These countries offer an example of heterogeneity in terms of differences in domestic energy resource endowment, various levels of renewable energy development, and a wide range of renewable energy ambitions. They are divided into regional categories based upon the seven sub-regions used in the ECE 2017 report entitled the "Global Tracking Framework: ECE Progress in Sustainable Energy." The considered regional categories are South East Europe, the Caucasus, Central Asia, and Western and Central Europe.

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# I. Introduction

1. Many ECE member States have pledged to increase their use of renewable energy to reduce carbon emissions to fulfill their commitments within the United Nations Framework Convention on Climate Change (UNFCCC). The following analysis also shows the progress of the selected countries toward achieving SDG 7.2 which aims to increase substantially the share of renewable energy in the global energy mix by 2030. Specifically, those countries that are part of the Energy Community were required to prepare and approve a National Renewable Energy Action Plan (NREAP) by 2013 to comply with European Union (EU) Directive 2009/28/EC. Each country agreed to produce a specified percentage of Total Final Energy Consumption (TFC) using renewable energy by 2020 with the larger goal of reducing greenhouse gas emissions (GHGs) in line with their Nationally Determined Contribution (NDC) to the UNFCCC. The NREAPs discuss state policies and strategies aimed at meeting these targets, and establish benchmarks for the main energy-consuming economic sectors including electricity production, heating/cooling, and transportation.

2. The considered ECE member States have undertaken various paths to achieve their renewable energy targets, and also vary in their current status toward the fulfillment of these targets. This document uses the ECE regional clusters as defined in the report entitled "Global Tracking Framework: ECE Progress in Sustainable Energy" and highlights a few countries from South East Europe, the Caucasus, Central Asia, and Western and Central Europe regions to show the challenges countries face both domestically and regionally. These countries include Bosnia and Herzegovina, Albania, Montenegro, Serbia, Georgia, Azerbaijan, Kazakhstan, Uzbekistan Germany, Italy, Netherlands, and Sweden. Azerbaijan, Kazakhstan, and Uzbekistan are not members of the Energy Community, and Georgia only recently joined, so the four countries do not have formal NREAPs, but they have made commitments to carbon emission reduction and the integration of renewable energy.

3. The countries of South East Europe largely rely on hydro power and coal-based thermal power, though are beginning to make progress integrating wind and solar. The Caucasus countries represent a mix of natural gas production for thermal power production, with Azerbaijan producing more than 80% of its electricity with natural gas. In contrast, Georgia produces more than 80% of its electricity with hydropower with natural gas filling the remaining demand. The countries of Central Asia all have substantial renewable energy potential, and Kazakhstan has recently made renewable energy pledges in its transition to a "Green Economy" model and plans to become a regional wind energy hub. Uzbekistan has also made renewable energy pledges, but plans to bolster its solar manufacturing and energy production industries. The Western and Central Europe region countries have more diversified energy mixes than the other regions, but show varying ability and will to fulfil their respective pledges.

# II. South East Europe

4. Albania, Bosnia and Herzegovina, Montenegro, and Serbia are the representative countries of the South East Europe region in this document. All four countries obtain more than 25% of their respective TFC from renewable sources, showing good progress toward increasing their share of renewable energy under SDG 7.2. Albania relies heavily on hydropower, and thus its ability to achieve its renewable target varies dependent on yearly precipitation. Bosnia and Herzegovina and Montenegro have reached their 2020 NREAP goals. Serbia can potentially meet its 2020 target by adding additional wind capacity

5. All four countries obtain large amounts of their respective energy needs from hydropower, which serves as the backbone for the region's energy mix. Domestic coal

resources support further use of coal-fired power generation, but wind power capacity is increasing throughout the region. The development of solar PV is limited largely due to fear of increased electricity prices, which is a result of previous failed attempts at feed-in tariffs (FiTs). The expansion of biomass generation, other than traditional use of fuel wood for residential heating and cooking, has not yet developed on a large scale.

6. Additionally, an ECE study assessing the water-food-energy nexus of the Drina River Basin shows how a cooperative approach can benefit all four riparian countries. Multi-state cooperation can mitigate against the effects of variability on downstream hydropower production, improve agricultural production, and reduce flooding. Transparent hydropower development planning and increased electricity interconnection could improve electricity production in the four countries and produce not only substantial savings, but also potential profits from the export of electricity to Italy and Croatia. With increased hydropower production, the need for thermal capacity will be reduced, thus reducing carbon emissions. Improved irrigation could also bolster the cultivation of biofuel crops.[1]

## A. Albania

7. Albania's NREAP has a renewable energy target of 38% of TFC by 2020.[2] The country's NDC is to reduce carbon emissions 11.5% by 2013 as compared to its Business-As-Usual (BAU) scenario. In 2014, 33% of TFC originated from renewable sources.[3]

8. Albania has pledged for 100% of electricity to come from renewable sources by 2020. Hydropower makes up 95% of the country's domestic electricity production capacity, though imports supplement electricity consumption. Variability in yearly rainfall affects yearly electricity production. For example, hydropower production fell 37% year-on-year in 2017 due to a lack of rainfall, though Albania had been a net exporter of electricity in 2016.[4]

9. Diversification of renewable energy generation will reduce Albania's dependence on annual rainfall for its electricity requirements. Additionally, increased renewable energy capacity will reduce dependence on imports, improve security of supply, and decrease the budget deficit. The International Renewable Energy Agency (IRENA) estimates Albania's cost competitive renewable energy potential to be 2 GW for hydro, 1.9 GW for solar, and 987–2153 MW for wind.[5] Albania's current hydro capacity is 1.5 GW so its potential for diversification is great, though dependent on obtaining financing through proper policy mechanisms.

10. The implementation of a feed-in-tariff (FiT) and a feed-in premium (FiP) intend to expand the country's renewable energy infrastructure. Unfortunately, the 2007 FiT for small hydro power plants (SHPPs) was set too high, representing a financial burden to the state-owned utility, and was reduced 30% after a loss of €32 M in 2012-2013. The revised 2013 Law on Renewable Energy continued the FiT for SHPPs up to 2 MW, and a FiP was introduced for wind and solar PV, but limited to the 2020 renewable energy targets of 30 MW and 50 MW respectively. Competitive, non-discriminatory auctions will allocate future FiPs, though installations larger than 10 MW will not be included.[6] The 2013 law also instituted net metering, but a low and regulated electricity price of €0.07/kWh provides little incentive for distributed generation. The country's underdeveloped transmission and distribution system limit the ability for renewable energy additions to the state's grid. A National Licensing Centre acts as one-stop-shop to shorten processing times and increase transparency. The National Energy Efficiency Fund plans to provide financing for renewable and energy efficiency projects but is not yet operational.

## B. Bosnia and Herzegovina

11. Bosnia and Herzegovina has a stated renewable energy target of 40% of TFC by 2020, which it achieved in 2014 with 42.3% of energy originating from renewable resources.[7] The country has pledged to reduce carbon emissions to 3% below its 1990 emissions or 23% below the BAU scenario by 2030.[8] Coal-based thermal and large-scale hydropower dominate the electricity sector, making up roughly 60 and 40% of total electricity production respectively. Hydropower production varies depending on yearly rainfall, so diversification of renewable sources is required to ensure that Bosnia and Herzegovina will maintain its NREAP achievement.

12. Current projections forecast an increase in electricity production, and the country plans to provide future electricity demand growth with fossil-based generation, specifically coal, increasing carbon emissions. Domestic coal resources are robust given domestic consumption requirements and Bosnia and Herzegovina's utilities own both the coal mines and coal-fired power plants, making a transition to renewable energy difficult given the vested interest in coal consumption. Vertical integration of energy production, domestic coal resources, and recent investments in future coal-based electricity generation may make the integration of additional renewable energy difficult in the near future.

13. Bosnia and Herzegovina's current quotas for renewable energy are relatively small and current state policies somewhat limit expansion, though the technical potential for renewable energy is large. For example, the current quota for solar PV is only 16.2 MW, yet IRENA estimates a cost competitive capacity for solar PV to be 1 GW. IRENA's estimate for wind potential is 2.5-5.9 GW yet the lack of a bankable Power Purchasing Agreement (PPAs) limits its expansion.[9]

14. Electricity subsidies keep retail prices artificially low making the entrance of renewables difficult to justify financially, but also lead to an unmaintained and upgraded transmission grid, which makes adding the variable generation of renewable energy difficult.[10] Reduction of subsidies and energy market liberalization will attract investment capital, but represents a burden to the state's citizens due to higher energy prices, thus a compensation mechanism may be required.

15. PPAs are not considered reliable enough to attract large-scale investment, even though feed-in-tariffs and feed-in-premiums are the some of the highest in the region. Permits for renewables projects often take more than a year to obtain leaving investors exposed to risk.[11] Net metering exists, but surplus production is not subject to remuneration.

16. The 50.6 MW Mesihovina wind power plant came online 2018, and negotiations are currently taking place for 50 MW wind farms at Galica and Vlasic, but overall the expansion in wind generation is still limited.[12]

## C. Montenegro

17. Montenegro has already achieved both its TFC and renewable energy electricity sectoral targets. In 2014, 44.9% of TFC and 53.4% of electricity consumption came from renewable energy sources.[13] The country has also pledged to reduce carbon emissions to 30% below the 1990 level by 2030.

18. Hydropower and coal-based thermal power provide the large majority of Montenegro's electricity with 658 MW and 218.5 MW of capacity respectively.[14] Domestic coal resources supply and are co-located with the country's sole thermal plant, Pljevlja, though coal production has been on a downward trend. Two wind power plants are in the

development stage with signed concession and PPA agreements. The Krnovo wind farm partially came online in 2017 adding 72 MW of capacity using financing originating from the European Bank for Reconstruction and Development (EBRD), the German Development Bank, and French investment company Proparco.[15] The Mozura wind farm is currently under construction and will add 46 MW of capacity when completed. The expansion of solar PV has been somewhat limited, but Montenegro's government has currently begun taking bids for a 200 MW solar farm at Briska Gora.[16]

19. Montenegro's FiT system applies to all renewable energy technologies and has government support for 12 years. Net metering is also in place for systems up to 50 kW, which promotes small-scale residential solar PV.[17] Foreign investors consider the purchasing power agreement (PPA) stable, as exemplified by the expansion of large-scale wind production. The government's land registry is limited making property acquisition for large-scale RE projects an obstacle to development. The wind and proposed solar farms are located on government land leased from the state of Montenegro.

20. The renewables investment environment is promising with large-scale solar and wind development in the country ongoing, as exemplified by the current auction for the solar farm at Briska Gora (200 MW) and a signed memorandum of agreement for an additional 50 MW of capacity at the Gvozd wind farm in Niksic municipality.[18] The Gvozd wind farm could power Montenegro's largest contributor to GDP and carbon emissions, its aluminum smelting industry, also located in Niksic municipality.

21. Clarification of land ownership and the creation of accurate land ownership maps will attract further foreign investment. A financing mechanism for residential or village-scale PV systems could expand distributed solar development and reduce the necessity for construction of transmission infrastructure. Electric heating and cooling are the norm in Montenegro, thus policies aimed at residential energy efficiency can both reduce reliance on electricity consumption and reduce carbon emissions. Montenegro could revisit implementing a policy such as MONTESOL, a 2011 UNEP program aimed at giving interest free loans to Montenegrin citizens to purchase residential solar water heaters, and add an educational campaign would lead to further adoption of the previously successful program.[19]

22. Overall, the total cost competitive potential for renewable energy expansion when compared to combined cycle gas turbine (CCGT) is 3.3 GW, which is larger than the current domestic generation capacity of roughly 1 GW.[20] Offshore wind generation is another potential avenue for the expansion of renewable capacity Therefore, any movement toward the construction of fossil fuel generation capacity is ill advised and the further expansion of renewable energy in the country is not only carbon neutral, but also cost competitive.

## D. Serbia

23. Serbia plans for renewable energy to make up 27% of TFC and 36.6% of electricity production by 2020. Coal leads Serbia's electricity generation mix with 3.9 GW of capacity, followed by hydropower and gas power plants, with 2.9 GW and 353 MW respectively. Serbia's electricity generation mix is mostly self-reliant due to domestically mined coal and hydropower, though Serbia imports the large majority of its natural gas from Russia. Serbia has pledged to reduce carbon emissions to 30% below its 1990 level by 2030.[21] IRENA projects that Serbia has a cost competitive renewable energy potential of 6.9 GW for solar PV and 5.6 GW for wind.[22]

24. By the end of 2015, Serbia had installed 10.8 MW of solar PV, which is larger than its NREAP solar commitment, but only 5 MW of biomass capacity, well below its 143 MW

biomass commitment. Serbia has an installed wind capacity of 10.4 MW, though its NREAP commitment projected 500 MW of wind capacity installed by 2020.

25. Recent policy actions appear to have made Serbia an attractive destination for foreign investment in large-scale renewable capacity additions, though smaller projects still face issues at the local level regarding land rights. In June 2016, Serbia instituted a new Purchase Power Agreement (PPA) model and a one-stop-shop for construction permits.

26. The Cibuk 1 plans to be one of the largest wind farms in South East Europe with 158 MW capacity, and the Alibunar farm will add 42 MW of capacity. The International Finance Corporation of the World Bank and the Green Growth Fund in partnership with foreign investors provided financing for these projects.[23] Cibuk 1 acquired a preliminary power producer agreement (P-PPA) and grid connection approval, and falls within Serbia's stated cap of 500 MW for wind energy support. The P-PPA requires a 2% deposit and, already 800 MW of wind capacity has achieved this status, indicating that Serbia will likely reach its 500 MW goal, though potentially not by 2020. The quota for solar PV (10 MW) has already been achieved. The low quota for PV was established due to fears of increasing the price of electricity, which is currently low and regulated. Net metering has not been expanded, because the subsidized electricity price makes it financially unviable. Overall, plans for the expansion of wind generation capacity are encouraging, but achievement of Serbia's NREAP goals by 2020 may not be possible.

# III. The Caucasus

27. Azerbaijan and Georgia are the two counties chosen as representative of the Caucasus. Both countries have substantial potential for growth in renewable energy generation. Azerbaijan's energy sector is dominated by its fossil fuel industry, but the country has now pledged to use its oil and gas wealth to add renewable capacity, most notably wind generation. Georgia intends to further expand its hydro capacity, and supplement electricity capacity with wind power during the low hydropower production winter months.

## A. Azerbaijan

28. Azerbaijan plans to obtain 20% of its electricity consumption and 9.7% of its TFC from renewable energy sources by 2020. The county has committed to reduce $CO_2$ emissions by 35% by 2030 in comparison to 1990.

29. Azerbaijan's energy mix is still dominated by fossil fuels, currently making up 80% of TFC, and the energy sector is the country's largest emitter of GHGs. Phase 2 of the Shah Deniz gas field is set to come online in 2020 and will allow Azerbaijan to export gas to the EU and Turkey. Funds obtained from oil and gas exports are allocated to the State Oil Fund of the Republic of Azerbaijan (SOFAZ) to finance state infrastructure projects, such as renewable energy development.

30. The renewable share of TFC was 4.4% in 2010 and 2.1% in 2014. The variation is due to seasonal and year-on-year changes in hydropower production, which makes up 1,132 MW of Azerbaijan's 1,267 MW of installed renewable power capacity. Additional renewable energy capacity can smooth this variability.

31. In 2017, Azerbaijan reported an installed capacity of 66 MW of wind, 38 MW in biomass, and 34.6 MW of solar PV.

32. In order to meet its 2020 goals, Azerbaijan intends to install new generation capacity equaling 350 MW of wind, 50 MW of solar, and 20 MW of bioenergy in accordance with

the Strategic Road Map and action plan for 2016-2020, adopted in 2016 and featuring a long-term vision toward 2025.

33. Further legislation is required to attract investment capital for renewables projects. This includes transparent and efficient permitting, defining responsibilities of the various state agencies, competitive feed-in tariff rates, purchasing power agreements within international standards, and dedicated financing facilities for renewable energy.[24]

## B. Georgia

34. In April 2017, Georgia officially joined the Energy Community, but does not yet have a formal NREAP or a NDC in place.

35. Georgia has the potential to position itself as a regional renewable energy hub. Increasing hydro production can bolster revenues from the export of electricity, while additional wind capacity can provide energy during the winter months when hydro production is reduced, and energy demand is highest.

36. The country has mostly focused on the expansion of its hydropower potential, as it is still the most cost-effective renewable energy resource in the country. Hydropower accounts for more than 80% of current electricity capacity, and more than 30% of TFC.

37. During the high energy demand winter months, security of supply is an issue due to depleted storage in reservoirs, sometimes requiring electricity imports. Electricity is exported to Turkey in the summer and spring. A diversification strategy featuring wind generation will reduce the need to import, as wind power is typically higher in winter months.

38. As one of the world's leaders in water resources per capita, the Ministry of Energy, now merged into Ministry of Economy and Sustainable Development, estimated Georgia's hydro potential at 40 TWh, yet only 20% of this potential has been utilized. Between 2013 and 2016, small scale hydro received USD 92M in investment and large scale hydro USD 309M. These investments represent more than 282 MW of additional hydro capacity.[25] These projects are facilitated by the Georgian Energy Development Fund in partnership with private investors.

39. Wind capacity will reduce the need for electricity imports in the winter months, when hydro production is lowest. 1.5 GW of wind energy potential is estimated and investments have begun to expand wind capacity.

40. The 20.7 MW Kartli wind farm, located outside of Tbilisi in Gori was completed in 2016.[26] The project was a joint venture between the state-owned Georgian Energy Development Fund and the Georgian Oil and Gas Corporation with partial financing from the European Bank for Reconstruction and Development (EBRD).

41. The country is still in the process of harmonizing its energy policies with those of the Energy Community and does not currently have any established laws or targets for renewable energy or energy efficiency.

42. Georgia's investor friendly tax environment has brought investment, but government policy is not viewed as stable, and a more structured approach to obtaining permits and agreements, such as PPAs, is required. Georgia has implemented a net metering program, which is conducive to SHPPs as local communities have been resistant to large scale hydro projects, and access to local industry professionals is limited.

# IV. Central Asia

43. The countries of Central Asia all have substantial renewable energy potential, which in some cases can be funded from fossil fuel and uranium resource exports. Kazakhstan has substantial coal, oil, natural gas, and uranium resources that can be exported to fund renewable energy investments, as it intends to become a regional wind energy hub. Uzbekistan, as well, has substantial coal, oil, natural gas and uranium resources, and is still dependent on fossil fuel electricity production, though is positioning itself as a solar PV manufacturing and solar power generation hub. Turkmenistan has large solar and wind potential but does not have any RE targets currently. In 2015, Kyrgyzstan and Tajikistan produced 45% and 23% of TFC by hydropower production respectively.

## A. Kazakhstan

44. Kazakhstan has recently made renewable energy pledges of 3% of TFC by 2020, 10% by 2030, and 50% by 2050 in its transition to a "Green Economy" model. Kazakhstan was recently the host of a ECE Renewable Energy Hard Talk, 26–27 April 2018.

45. In 2016, Kazakhstan reported a total installed renewable energy capacity of 2,855 MW, including 2,688 MW of large-scale hydropower, 98.52 MW of wind and 57.3 MW of solar PV.

46. In 2016, the country took additional steps to amend its legislation on renewable energy through the law on "amendments and additions to some legislative acts of Kazakhstan on the transition of the Republic of Kazakhstan to the green economy" and the law on "supporting the use of renewable sources of energy".

47. A first round of Renewable Energy (RE) auctions in May 2018 was successful in procuring ten wind energy projects for a total of 20GW of capacity. The total capacity to be auctioned in 2018 is 1 GW. The results of the solar auctions were mixed and some re-working of the auction rules may be required [27]

48. The RE Energy Hard Talks have led to the initiation of a number of RE specific policies including the previously mentioned RE auctions, the integration of a national systems operator, secure PPA agreements, tariff indexation to account for interest rate and currency fluctuation, and a land plot granting regime. These policies overall are aimed at increasing transparency and RE regulation, while reducing investor risk to increase investment in the renewable sector.

## B. Uzbekistan

49. Uzbekistan's current 2015 RE share of TFC was 3%, and the country has made RE pledges for electricity generation.

50. Uzbekistan has pledged to construct 100-200 MW of wind and solar capacity by 2020. The country has also pledged to increase its share of RE in its electricity generation mix to 16% by 2030 and 19% by 2050.

51. Uzbekistan does not yet have a NREAP of FiT, but it has a policy of special premiums for solar projects built with domestic solar PV modules, intending to bolster domestic PV manufacturing and solar energy production. FiT and net metering would increase domestic demand for solar panels.

# V. Western and Central Europe

52. The countries described in this study as "Western and Central Europe," are in general larger than the other countries discussed in terms of GDP, and thus can be considered as more advanced economically, but many of the same issues regarding the integration of renewable energy exist in these countries as those in the countries discussed in South East Europe, Caucasus, and Central Asia regions.

53. The countries considered in the "Western and Central Europe" region are all EU members and as members of the Energy Community have produced NREAPs with estimated trajectories with yearly benchmarks for renewables integration in overall TFC and in the electricity, heating/cooling, and transportation sectors. The countries considered as representative of Western and Central Europe are Germany, Italy, Netherlands, and Sweden. Overall, their energy mixes are more diversified than the other ECE regions, though they have varied capacity and will to obtain their respective renewable energy pledges. The use of EU-region data highlights the trends in achieving NREAPs and sectoral pledges. The Eurostat data includes some countries of the South East Europe region as defined in the 2017 report "Global Tracking Framework: ECE Progress in Sustainable Energy," though the four countries highlighted in this report as South East Europe are not in the EU.

54. In 2017, the EU Commission produced the "Renewable Energy Progress Report" which tracks the EU, as a single entity, in its move to achieve its Renewable Energy Directive 2009/28/EC. In 2015, the EU's renewable energy share of TFC was 16.4%, while the trajectory set forth in the NREAPs was 13.8% for 205/2016. 28 The use of EU Commission data is more up-to-date than the data provided for non-EU members, and additionally it has been divided by sector, which is useful for policymakers when deciding where to focus efforts.

55. The EU heating/cooling sector has an estimated renewable energy share of 18.1% in 2015, above its 16% expected share.

56. 28.3% of the EU's electricity came from renewable energy sources, again ahead of trajectory.

57. Hydropower produces the largest share of the EU's renewable electricity at 38%. Sweden, France, Austria, and Spain account for roughly 70% of the EU's hydropower.

58. During the period of 2004–2005, wind power production more than quadrupled, and now accounts for roughly a third of renewable energy production. Onshore wind production is slightly behind its planned trajectory for the EU overall, and is led by Germany and Spain. Sweden, Germany, the United Kingdom, and Denmark are ahead of their respective offshore wind trajectories, but the EU as a whole is 12% behind its 2015 trajectory, though offshore wind development is increasing in recent years, as capital costs have decreased and grid connection is becoming easier.

59. Solar PV made up 12% of EU renewable energy production, surpassing biomass for the first time. Germany, Italy, and Spain are the EU leaders in solar PV accounting for 38% of all EU solar PV generation. Rapid technological progress, cost reductions, and shorter project development times have increased the deployment of solar PV, and prospects for increased deployment are strong.

60. Biomass electricity generation is growing, but did not meet its 2015 target. Biomass and bioliquids combined to produce 7% of renewable electricity, which is faster growth than expected from the negligible levels of production in 2004. Germany and Italy lead in biogas production.

61. The transport sector is the only EU sector currently lagging behind its aggregated NREAP trajectory, with renewable energy making up only 6% of transport energy consumed, below the 10% 2020 target. This is due to relatively high GHG mitigation costs and regulatory uncertainty.

62. Biofuels make up 88% of the renewable energy consumed in the transport sector, with electricity still playing a smaller role in transport. Renewable electricity is 13% its 2015 NREAP trajectory.

63. All EU members achieved their RES trajectories for 2013/2014 except for Netherlands. Three member States, Netherlands, France, and Luxembourg, had estimated renewable energy shares below the 2015/2016 trajectory. Below some countries are considered as example.

## A. Germany

64. Germany has achieved its 2016 trajectory benchmark for RE share of TFC and electricity and appears to be on course to achieve its 2020 NREAP goal. Germany is an EU leader in solar, wind, and biomass production. The country is only slightly below trajectory for 2016 in heating/cooling for its NREAP, indicating that country can meet its 2020 goals. In 2016, 12.9% of heating/cooling and 6.9% of transport came from renewable energy sources, and the 2016 benchmark goals establish in its NREAP were 12.4% and 7.1% respectively, overall reflecting positively on Germany's 2020 prospects.

## B. Italy

65. Italy has achieved its TFC, electricity, and heating/cooling pledges defined with its NREAP.[29] The country has yet to achieve its transport 2020 goal, but it is on trajectory to do so given its NREAP benchmark for 2016 is 7.3% of transport to be derived from renewable sources, where the Eurostat data shows Italy had achieved 7.24% of transport from renewable sources in 2016.

## C. Netherlands

66. Netherlands is not on track to meet its 2020 NREAP targets. The country is behind its 2016 trajectory goals in all three sectors and its overall TFC. Notably, the country's RE share of TFC in 2016 was 5.97%, yet its trajectory goal for 2016 was 9.7%, and its 2020 goal is 14% of TFC, which is no longer considered likely.

67. The oil and gas industry of Netherlands provides roughly €7B per year to the Dutch government, and a long-term reliance on fossil fuels for primary energy production has created dependence and entrenched infrastructure.[30] Additionally, sharply declining gas production has now forced Netherlands to begin large-scale and costly imports of natural gas. Recent announcements of €100M to be allocated toward offshore North Sea wind production, the implementation of a tax on coal production, and the announced closing 5 coal-fired power plants by 2020 are indications of movement toward its renewable energy and carbon emission goals, but Netherlands likely will not meet its NREAP 2020 benchmarks until 2030.

### D. Sweden

68. Sweden reached all its 2020 NREAP benchmarks by 2016. Additionally, the country has 2020 percentage shares of renewable energy goals higher for each sector and for overall TFC than any of the other countries from Western and Central Europe examined. Currently more than half of TFC, more than 60% of heating/cooling and electricity, and more than 30% of transport are derived from renewable sources. Further, more than 83% of electricity comes from nuclear and hydroelectric power, and 7% from wind energy.[31]

69. In 1970, fossil fuels accounted for roughly 75% of Swedish energy consumption. This is largely due, at the time, to the use of oil for residential heating. Today, Sweden has one of the highest energy use per capita in the world, but only releases 4.25 tonnes of CO2 per capita per year. This is low compared to the EU average of 6.91 tonnes and the US average of 16.15. The country turned away from fossil fuel use after the 1973 and 1979 oil crises.

## VI. Conclusion

70. The progress of the considered ECE member States to achieve their respective renewable energy pledges vary depending on natural resource endowment, capability and other factors to achieving these goals. The countries of South East Europe largely produce energy via hydropower and coal. The potential for EU accession has led these countries to develop NREAPs, and all have made progress toward achieving these goals. The movement in this region toward expanding renewable energy capacity is positive, but a potential regression to coal generation is possible. The Caucasus and Central Asia members highlighted have made non-binding commitments and are developing policies to obtain them. Recent ECE Hard Talks in Kazakhstan, Azerbaijan, and Georgia have had a positive impact on the development of these policies and the eventual uptake of renewable energy. Kazakhstan has made renewable energy pledges and passed legislation aimed at achieving these goals. Azerbaijan has made renewable energy pledges, though still needs to pass the legislation required to implement these pledges. Georgia has joined the Energy Community and will therefore be required to make renewable energy pledges, though its electricity production is already heavily dominated by hydropower. The ECE members of Western and Central Europe have showed mixed progression toward their NREAPs. Sweden has shown that a long-term commitment to diversification from fossil fuels has proved beneficial in grid decarbonization. Germany and Italy both appear to moving toward achieving their 2020 renewable energy commitments, and a long-term reliance on fossil fuel production and consumption has made Netherland's path difficult.

# Annex

**2020 Renewable Energy Targets in the considered ECE countries**

| *Country* | *RE Share of TFC* | *RE Share of Electricity* | *RE share of Heating Cooling* | *RE share of Transport* |
|---|---|---|---|---|
| Bosnia and Herzegovina | 40.0% | 56.9% | 52.4% | 10.1% |
| Albania | 38.0% | 100.0% | n/a | n/a |
| Montenegro | 33.0% | 51.4% | 28.2% | 10.2% |
| Serbia | 27.0% | 36.6% | 30.0% | 10.0% |
| Georgia | n/a | n/a | n/a | n/a |
| Azerbaijan | 9.7% | 20.0% | n/a | n/a |
| Kazakhstan | 3% | n/a | n/a | n/a |
| Uzbekistan | 100-200 MW | n/a | n/a | n/a |
| Germany | 18.0% | 38.6% | 15.5% | 13.2% |
| Italy | 17.0% | 26.4% | 17.1% | 10.0% |
| Netherlands | 14.0% | 37.0% | 8.7% | 10.3% |
| Sweden | 49.0% | 63.0% | 62.0% | 14.0% |

**RE Share of TFC in 2016 in the considered ECE countries[32]**

| *Country* | *RE Share of TFC* | *RE Share of Electricity* | *RE share of Heating Cooling* | *RE share of Transport* |
|---|---|---|---|---|
| Bosnia and Herzegovina | 42.3% | n/a | n/a | n/a |
| Albania | 37.9% | 85.97% | 33.83% | 0% |
| Montenegro | 41.55% | 50.96% | 69.19% | 1.10% |
| Serbia | 20.90% | 29.23% | 24.24% | 1.22% |
| Georgia | >30% | n/a | n/a | n/a |
| Azerbaijan | 2% (2014) | n/a | n/a | n/a |
| Kazakhstan | 1.4% | n/a | n/a | n/a |
| Uzbekistan | 3% (2015) | n/a | n/a | n/a |
| Germany | 14.80% | 32.20% | 12.90% | 6.90% |
| Italy | 17.4% | 34% | 18.9% | 7.24% |
| Netherlands | 5.97% | 12.50% | 5.45% | 4.63% |
| Sweden | 53.82% | 64.86% | 68.60% | 30.29% |

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**Group of Experts on Energy Efficiency**
**Fifth session**
Kiev, 13–15 November 2018
Item 6 of the provisional agenda
**Regulatory and policy dialogue addressing barriers to improve energy efficiency and renewable energy**

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# Regulatory and policy dialogue addressing barriers to improve energy efficiency and renewable energy

## Background paper on progress in the areas of energy efficiency and renewable energy in selected countries of South-Eastern Europe, Eastern Europe, and Central Asia, and in Russian Federation

**Note by the secretariat**

## I. Background information

1. A number of legislative, policy, economic, and financial barriers to significant improvements in energy efficiency and increased uptake of renewable energy remain. It is important to identify policies and measures that reduce barriers to increasing investment and financing flows to energy efficiency and renewable energy projects, with an emphasis on commercial projects and private financing. A valuable aspect is transferability of successful measures in selected countries to other United Nations Economic Commission for Europe (ECE) member States. Particular attention needs to be given to the reasons why energy efficiency improvement and uptake of renewable energy are lagging behind what is necessary to achieve climate objectives and sustainable development goals.

2. In the period of 2007–2014, ECE was executing project Financing Energy Efficiency and Renewable Energy Investments for Climate Change Mitigation. The long-

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term objective of the project was to promote an investment climate in which self-sustaining energy efficiency and renewable energy projects can be identified, developed, financed and implemented. The project achieved most of its objectives and the final project report has been prepared. It provided a basis for the analysis of developments occurred in the beneficiary countries in the period from 2010 to present days. This background paper presents main findings and outcomes of the final report of the project.

## II. Main objectives and methodology of the report

3. The report looks at policy, regulatory and institutional reforms; capacity of stakeholders in the countries; best practices developed and introduced; and awareness raising aimed at improving investments into energy efficiency and renewable energy. It also looks at the processes in the area of energy efficiency and renewable energy, which are particularly beneficial for the countries and can be recommended for replication and scaling up. It highlights the existing gaps related to energy efficiency and renewable energy in the areas of policy, regulatory and institutional frameworks, financial environment, and education and awareness.

4. The geographic focus of the report is selected ECE member States from South-Eastern Europe, Eastern Europe, and Central Asia, which were beneficiary countries of the project mentioned in para. 2. These are Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Serbia, and the former Yugoslav Republic of Macedonia (South-Eastern Europe), Belarus, Republic of Moldova, and Ukraine (Eastern Europe), Kazakhstan (Central Asia), and Russian Federation.

5. The survey on progress in the areas of energy efficiency and renewable energy since 2010 in the selected countries was conducted over the period of 1 March – 30 April 2018. It was addressed to the responsible authorities for energy efficiency and renewable energy in these countries. The survey was made available in English and Russian. Evaluation of responses from the countries was complemented by a desk research to assess overall progress in the areas of energy efficiency and renewable energy in the selected countries.

## III. Progress in the policy area to promote energy efficiency and renewable energy

6. According to the study, most of the countries have adopted the dedicated framework legislation on energy efficiency and renewable energy. Since 2010, legislation on energy efficiency and energy saving has been adopted in Albania (2015), Belarus (2015), Bosnia and Herzegovina (both in Federation of Bosnia and Herzegovina and in Republika Srpska in 2013), Bulgaria (2016), Croatia (2014), Kazakhstan (2014), Republic of Moldova (2010), Russian Federation (2009 with latest amendment in 2014), Serbia (2013), and Ukraine (2017).

7. The laws on renewable energy have been adopted in Albania (2017), Belarus (2010), Bosnia and Herzegovina (in both entities in 2013), Bulgaria (2011, amended in 2017), Croatia (2015, amended in 2017), Kazakhstan (2013), Republic of Moldova (2016, amended in 2017), and Ukraine (2003 with the latest amendment in 2017).

8. The Energy Development Strategies until 2030 have been developed and adopted in Albania (2018), Bosnia and Herzegovina (Republika Srpska in 2012), Bulgaria (2011), Croatia (draft of 2017), Republic of Moldova (2013), Russian Federation (2009), Ukraine (2017), and the former Yugoslav Republic of Macedonia (2010).

9. The National Energy Efficiency Action Plans (NEEAP) have been developed in Albania (2017), Bosnia and Herzegovina (Federation of Bosnia and Herzegovina in 2017), Bulgaria (fourth NEEAP adopted in 2017), Croatia (fourth NEEAP adopted in 2017), Republic of Moldova (second NEEAP adopted in 2016), Serbia (third NEEAP adopted in 2016), Ukraine (2015), and the former Yugoslav Republic of Macedonia (second NEEAP adopted in 2017).

10. The National Renewable Energy Action Plans (NREAP) have been developed in Albania (2016), Bosnia and Herzegovina (Federation of Bosnia and Herzegovina in 2014), Bulgaria (2012), Croatia (2013), Kazakhstan (2013), Republic of Moldova (2013), Serbia (2013), Ukraine (2014), and the former Yugoslav Republic of Macedonia (2015, amended in 2017).

11. Development of the secondary legislation was boosted in all selected countries since 2010. Comprised of various types of by-laws produced by different governmental bodies, the adopted secondary legislation includes Presidential decrees, Governmental resolutions and decrees, resolutions of National Commissions, rulebooks, ordinances, regulations, specific decisions and rules. Norms, standards and technical regulations are completing the regulatory framework related to energy efficiency and renewable energy in the countries.

12. The institutional framework is formed by the institutions at the national and local levels acting in the areas of energy efficiency and renewable energy in the selected countries. The energy agencies are established in Albania, Bulgaria, Croatia, Republic of Moldova, Russian Federation, Ukraine, and the former Yugoslav Republic of Macedonia.

## IV. Progress in building capacity to promote energy efficiency and renewable energy investments

13. The study indicates that the countries enhanced capacity of stakeholders in different sectors. The activities which helped improving capacity of authorities in the public sector included organization of trainings of staff in the ministries, governmental agencies and municipalities; conferences on energy efficiency and renewable energy policies and project development, international fora on sharing knowledge and experiences in energy efficiency and renewable energy areas; licensing programmes for engineers; trainings on energy management; as well as knowledge transfers among managers at the middle and senior levels.

14. The capacity building activities for stakeholders in utilities, energy service companies (ESCOs), consulting firms, and energy audit companies, among others, included trainings on energy efficiency and renewable energy for energy producing and consulting companies; explanation of regulations and procedures for ESCOs; introduction of the management system and standards for consulting companies; as well as international exhibitions and fora for introduction of the eco-friendly technologies.

15. The activities that helped the end-users included development of the support programmes for financing in industry and residential sector; introduction of energy management process in the residential system; adoption of programmes for energy renovation of single-family houses and multi-apartment buildings; organization of international conferences to promote energy efficiency measures and use of renewable energy.

16. The activities, which enhanced capacity for energy efficiency and renewable energy investments within the financial services, included dissemination of information on the available international technical assistance programmes for energy efficiency and renewable energy projects; dissemination of information on possibilities for commercial

and non-commercial project financing; transfer of know-how and thematic expertise among bigger banking groups; technical assistance for project development and financing for financial service companies and project developers; and organization of various capacity building events.

## V. Progress in developing and introducing best practices to energy efficiency and renewable energy investments

17. Implementing effective policies and measures plays important role in better realizing the potential of energy efficiency and uptake of renewable energy in the countries. The best policy practices in the countries under review can be seen in adoption of relevant energy efficiency and renewable energy regulations and establishing institutional structures based on the territorial-sectoral principle; adoption and update of the national energy efficiency and renewable energy action plans; establishment of energy efficiency funds for financing of programmes and projects in the area of energy efficiency and renewable energy; introduction of energy management systems; and establishing the feed-in support schemes for renewable energy and ESCO contracts in the public sector.

18. The best practices in project development, among others, include carrying out the energy audits, introduction of feed-in tariffs for electricity generation from the renewable energy installations; operation of energy efficiency co-financing programmes; operation of the budgetary fund for energy efficiency; introduction of support schemes for installation of solar water heaters, replacement of windows, and other energy efficiency and renewable energy measures.

19. The best approaches to investments into energy efficiency and renewable energy in the selected countries were the adoption of by-laws to support the investments; establishment of national energy efficiency and renewable energy funds; implementation of co-financing options for promoting energy efficiency investments; and introduction of the auction system as a renewable energy support mechanism.

## VI. Progress in energy efficiency and renewable energy project development and financing

20. Initiatives by governments in the countries are identified in adoption and implementation of the state programmes and establishment of specialized funds, such as the State Programme "Energy Saving" in Belarus; Environmental Protection and Energy Efficiency Fund of the Republika Srpska and Environmental Fund of the Federation of Bosnia and Herzegovina (both in Bosnia and Herzegovina); the Environmental Protection and Energy Efficiency Fund in Croatia; the State Programme "Energy Efficiency and Energy Development" in the Russian Federation; Energy Efficiency Budgetary Fund in Serbia; and the support scheme for installation of solar water heaters by the Ministry of Economy in the former Yugoslav Republic of Macedonia.

21. Among the existing financing schemes and mechanisms, the countries established funds of the national and local budgets, introduced special environmental fee on registration of motor vehicles, are using the structural funds of the European Union for stimulating energy efficiency and renewable energy projects, introduced the "green tariffs", and provided tax incentives.

22. Various instruments were used for financing of energy efficiency and renewable energy projects. They vary, for example, from credit financing and loans in Belarus and Bosnia and Herzegovina to grants in Ukraine and the former Yugoslav Republic of

Macedonia. Commercial loans through local banks and microcredit foundations in Bosnia and Herzegovina offer the end-users more favorable terms (lower interest rates) than standard commercial loans.

23. Technical assistance for project financing is usually provided through allocation of grant funds to bring viable energy efficiency and renewable energy projects to bankability to enable financing from domestic and international financial institutions, development banks, commercial banks and other sources of debt or equity financing. The World Bank, United Nations Development Programme (UNDP), International Finance Corporation (IFC), European Bank for Reconstruction and Development (EBRD), European Union (EU), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), United States Agency for International Development (USAID), European Investment Bank (EIB), Kreditanstalt für Wiederaufbau (KfW), and Global Environment Facility (GEF) are among the most active international institutions providing technical assistance in these countries. International donors and development banks continue to be an important source of debt financing and grants for energy efficiency and renewable energy projects.

24. The development of the energy service market in the countries varies significantly. The ESCO market is in the development or initial phase in Belarus, Bosnia and Herzegovina, and the former Yugoslav Republic of Macedonia, while being more developed in Croatia, Russian Federation, Serbia, and Ukraine.

## VII. Processes in the area of energy efficiency and renewable energy beneficial for the countries

25. The study also looks at the processes led by ECE and other United Nations Regional Commissions in the area of energy efficiency and renewable energy, which are particularly beneficial for the countries and can be recommended for replication and scaling up. The identified processes include several internationally implemented projects, conducted events and prepared publications in the period of 2012-2017.

26. The project "Promoting Energy Efficiency Investments for Climate Change Mitigation and Sustainable Development", implemented by ECE (lead agency) in collaboration with the other United Nations Regional Commissions (Economic and Social Commission for Asia and the Pacific (ESCAP), Economic and Social Commission for Western Asia (ESCWA), Economic Commission for Africa (ECA), and Economic and Social Commission for Latin America and the Caribbean (ECLAC)) in 2012-2014, conducted several workshops and other capacity building activities. The project combined technical assistance in design and implementation of investment projects, advice on policy and institutional reforms, and direct links with financial institutions (banks and investment funds) to establish mechanisms, which were able to fast-track the development of self-sustained markets for energy efficiency.

27. The project "Promoting Renewable Energy Investments for Climate Change Mitigation and Sustainable Development", implemented by ESCWA (lead agency) in collaboration with ECE in 2015-2017, conducted trainings of experts at the national and municipal levels in project development, finance and business; developed case studies on experience of policy reforms in the countries; developed an investment project pipeline and provided further assistance to project developers.

28. The project "Energy Efficiency Standards in Buildings in the UNECE Region", under joint implementation by the Sustainable Energy Division and Forests, Housing and Land Management Division of ECE in 2017-2018, is focused on improving energy efficiency in buildings and reducing global greenhouse gas emissions from buildings in the

ECE region through improved knowledge of policy makers and building sector professionals in application of high-performance energy efficiency building standards.

29. The annual International Forum on Energy for Sustainable Development, organized since 2010, has made major contributions to the global dialogue on implementing the Sustainable Energy for All initiative and achieving targets of the Sustainable Development Goal (SDG) 7 on affordable and clean energy.

30. In 2014, the ECE Group of Experts on Energy Efficiency was established with mandate to carry out activities that help significantly improve energy efficiency in the region, including, in the selected countries. Also in 2014, the ECE Group of Experts on Renewable Energy was established and mandated to carry out activities that help significantly increase the uptake of renewable energy in the region and help achieve the objective of access to energy for all in the ECE region.

31. Renewable Energy Hard Talks have been organized within GERE work in member States (Georgia, Ukraine, Azerbaijan and Kazakhstan in 2017-2018) on new possibilities for developing sustainable energy and promoting renewable energy investments. The Hard Talks promote demand-driven debate directly in the countries on what is needed to change to allow the private sector to invest in sustainable energy and substantially increase the uptake of renewable energy. In the framework of the International Forum on Energy for Sustainable Development, a dedicated Matchmaking event has been organized since 2016 to promote renewable energy investments.

32. A number of analytical policy studies to assess the progress in energy efficiency and renewable energy policies and investments have been prepared, namely:

- Analysis of National Case Studies on Policy Reforms to Promote Energy Efficiency Investments (2015)
- Best Policy Practices for Promoting Energy Efficiency (two editions, 2015 and 2017)
- UNECE Renewable Energy Status Report (two editions, 2015 and 2017)
- Experience in the Europe and CIS Region with Clean Energy – UNDP, GEF and UNECE (2016)
- Overcoming Barriers to Investing in Energy Efficiency (2017)
- Global Tracking Framework: UNECE Progress in Sustainable Energy (2017)
- Status and Perspectives for Renewable Energy Development in the UNECE Region 2017 (2018)

## VIII. Remaining gaps related to energy efficiency and renewable energy in the countries

33. The study highlights the existing gaps related to energy efficiency and renewable energy in the areas of policy, regulatory and institutional frameworks, and financial environment.

34. In the policy area, the framework legislation on energy efficiency is not adopted in the former Yugoslav Republic of Macedonia. The legislation on renewable energy does not exist in the Russian Federation, Serbia, and the former Yugoslav Republic of Macedonia. Energy development strategies have not been adopted in Belarus, Kazakhstan, and Serbia. Some project countries also do not have National Energy Efficiency and Renewable Energy Action Plans. NEEAP has not been adopted in Belarus, Kazakhstan, and Russian

Federation. NREAP has not been adopted in the Russian Federation. Secondary legislation is far less developed and adopted in the project countries. Development of the dedicated secondary legislation needs more attention and further actions from the policy makers' side.

35. The governmental institutions responsible for energy efficiency and renewable energy in the reviewed countries are mostly represented only at the national level. Even when local institutions exist they are often not functioning effectively. The dedicated agencies and intermediate management structures that deal with energy efficiency and renewable energy have not been established in Bosnia and Herzegovina, Kazakhstan, and Serbia.

36. The financial environment for investments in energy efficiency projects remains risky due to low energy tariffs and energy subsidies in many countries, which do not provide investors with attractive rates of return on their investments.

37. To promote investments in renewable energy, some countries introduced feed-in tariffs or premiums. However, official expansion goals were not introduced in Belarus. Investment incentives, subsidies and benefits do not exist in the Republic of Moldova. Green certificates are not present in any of the reviewed countries. Auctions are introduced only in the Russian Federation. Renewables portfolio standards or quota system exists only in Belarus. Guaranteed grid access for electricity generated from renewable energy sources exists only in a few countries. None of the countries have net metering and net billing.

38. Commercial financing lacks incentives, while the investments in the countries are mainly driven by international donors and development banks in the form of debt financing or grants from the World Bank, EBRD, and KfW. The important lenders for countries in South-Eastern Europe are also the European Commission, the Council of Europe Development Bank, and EIB.

## IX. Conclusions and recommendations on policies and actions to increase financing into energy efficiency and renewable energy

39. The study examined policy, regulatory and institutional reforms to promote energy efficiency and renewable energy in the selected countries. Bulgaria and Croatia, as members of the European Union, were required to transpose the EU Directives' provisions into their national laws to ensure major energy savings for both consumers and industry. Albania, Bosnia and Herzegovina, Republic of Moldova, Serbia, Ukraine and the former Yugoslav Republic of Macedonia are the contracting parties of the Energy Community and made legally binding commitments to adopt the EU energy legislation which boosted the development of policy, legislative and regulatory frameworks in these countries. Belarus, Kazakhstan and the Russian Federation also achieved significant progress in the areas of energy efficiency and renewable energy since 2010.

40. The countries also made progress in the capacity building process to promote energy efficiency and renewable energy investments. National and local authorities, project developers and owners as well as financial institutions gained knowledge about new technologies, new financial instruments and ways of attracting investments in energy efficiency and renewable energy. The capacities of public institutions and the private sector in development of energy efficiency and renewable energy projects were increased from financial assessment and bankability conditions point of view.

41. Since 2010, the countries developed and introduced certain best policy practices and practices in project development, best approaches to investments into energy efficiency and renewable energy and innovative financing mechanisms that allowed increasing

investments into the areas. The existing processes in the area of energy efficiency and renewable energy, including implementation of the international projects, organization of events and conduct of research also facilitated the countries' progress in the areas of energy efficiency and renewable energy.

42. Despite achieved progress, the study also highlighted existing gaps related to energy efficiency and renewable energy in the areas of policy, regulatory and institutional frameworks, and financial environment, and education and awareness in the countries. To address the existing gaps, the study proposes the following recommendations:

- National Energy Efficiency Action Plans should be adopted in those countries that have not done so yet (Belarus, Kazakhstan, and the Russian Federation). A National Renewable Energy Action Plan should be adopted in the Russian Federation.
- Policy makers from the selected countries should focus more on development and subsequent enforcement of the secondary legislation on energy efficiency and renewable energy.
- Development and implementation of policies related to energy efficiency and renewable energy should be coordinated at the national, regional (provincial), and local levels. Absence of such coordination often leads to ineffectiveness of the adopted policies in the countries.
- All relevant stakeholders (policy makers, business community, financial institutions, academia, and civil society) should be brought into the process of formulation of energy efficiency and renewable energy policies. This would help in developing consensus and facilitating future implementation of policies.
- The ongoing nature of policy development requires consistent and sustained introduction of new measures and their constant improvement. To achieve the national targets, the governments should introduce new regulations, update the existing ones and constantly monitor their implementation.
- In order to be effective, energy efficiency and renewable energy related policies should be predictable and consistent in the long term. They also have to be aligned with the existing energy market structure and coordinated with other existing policies.
- The dedicated governmental institutions or agencies should be created in those countries where they do not exist yet to ensure implementation of energy policy in the country, improvements in energy efficiency, and increased uptake of renewable energy.
- Further work needs to be done to improve investment climate for energy efficiency and renewable energy projects. Efforts to attract investments in this area should become a special focus for governments.
- The countries should concentrate more on introducing incentives (financial and non-financial) and supporting schemes for energy efficiency and renewable energy investments.
- Energy subsidies should be eliminated in the countries (while ensuring that the level of energy poverty does not increase, and that vulnerable population has access to affordable and clean energy) as they discourage energy efficiency and renewable energy investments and do not provide investors with the opportunity to receive expected rate of return on their investments.

- Additional efforts should be made in the countries to reduce perception of the commercial financial institutions that financing of energy efficiency and renewable energy projects carry high risks.
- Awareness raising should be one of the priorities for the national authorities to avoid obstacles to promoting energy efficiency and renewable energy.
- Information exchange activities and trainings should become an integral part of energy efficiency and renewable energy development strategies.
- The international development agencies working in the countries can provide significant benefits through supporting activities aimed at increasing public awareness of energy efficiency measures and use of renewable energy sources through public campaigns and pilot projects.